ABSTRACT OF THE DISCLOSURE

The present invention describes new organic light emitting devices (OLED) based on dendritic and hyperbranched materials with cascade, tree-like architecture. It suggests special design of highly emissive dendrimers with lanthanide (Ln^{3+}) ions (for example, Eu^{3+}/Tb^{3+}) in their core providing efficient light harvesting similar to bacteriorhodopsine and other natural photosynthetic systems. The proposed design has a number of advantages with respect to known electro-luminescence devices. Color of the light emission can be controlled by proper selection of the core, whereas special surface groups can provide good solubility of the material, which is extremely important for spin cast fabrication of the sandwich devices. In order to prevent lanthanide (Ln^{3+}) aggregation leading to self-quenching processes the Ln^3 ions are surrounded by dendritic shell. The dendritic branches are designed such to have a HOMO-LUMO energy gap near 4f energy level of the lanthanide core, providing a vectorial charge and exciton transport towards the light emitting center placed in the dendritic core. The energy transfer by the Dexter energy exchange mechanism from triplet states of the periphery to Ln^{3+} core ensures high light emitting efficiency of the device. The invention can be used in all applications where highly efficient and flexible organic multicolor (red, green, blue) or white light emitting OLED devices are required, including highly efficient color displays for computers, TVs and mobile phones, as well as devices for signal processing and general lighting applications.